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Positions

2008–Now Computational Scientist, California Institute of Technology

2005–2008 Assistant Scientist, California Institute of Technology

2004–2005 Postdoctoral Fellow, California Institute of Technology

Education

2004 CALIFORNIA INSTITUTE OF TECHNOLOGY
Doctor of Philosophy, Department of Materials Science

1999 CHINESE ACADEMY OF SCIENCES
Master of Science, Fujian Institute of Research on the Structure of Matter

1996 PEKING UNIVERSITY
Bachelor of Science, Department of Physics

Projects

Monte Carlo Neutron Ray-tracing simulations for neutron scattering experiments

This research is sponsored by the Spallation Neutron Source at ORNL. We develop neutron data analysis techniques based on Monte-Carlo neutron ray-tracing simulations. This project builds upon the MCViNE software package, for which I am the lead developer, started during the DANSE software project:

- Modeling of neutron scattering mechanisms of various kinds using Monte Carlo ray-tracing
- For the first time, OOP paradigm is applied to MC neutron ray tracing simulations. Design patterns: visitor, composite, etc.
- 246,000 lines of C++, Python, Makefile, xml

Measuring ground deformation and ground elevation using optical imagery

This is a collaboration research with the Tectonics Observatory of Caltech. We develop image correlation technologies with a wide variety of applications, including a study of sand-dune movements on Mars for the Curiosity Mars rover mission. As the architect and a co-Investigator, I

- employed dynamic programming to develop a regularized correlation method
- developed a multi-scale correlation algorithm that extends single-scale correlation algorithms to work with much larger displacements;
- am migrating its software architecture over to high-performance computing environments.

Virtual Neutron Facility

I was the lead developer of the Virtual Neutron Facility, a suite of web applications that provide scientists computing tools to perform virtual neutron experiments.

- sophisticated architecture including components for database, data storage, job factory/scheduler/monitor, web user interface, and user communication.
- Python-based. 53,000 lines of Python code by a team of 3 developers

User interface abstraction - LubanUI LubanUI is an open source web UI framework that allows domain experts without knowledge of javascript to create user interface from simple, generic abstractions of UI elements and actions. It encourages separation of business logic from user interaction logic.

DrChops I was the main author of DrChops, a reduction software for direct-geometry neutron chopper spectrometers capable of reducing event-mode data, which helped produce some earliest publications of the ARCS instrument, including the first Physical Review Letter paper, and the first PhD thesis.

Development of Mossbauer Powder Diffractometry Mossbauer powder diffractometry is a pioneering diffraction technique using gamma-rays. My PhD thesis work includes development of its theory and experimental hardware/software, and analysis of diffraction data using multivariable regression.

Ab initio study of non-linear optical materials During my master thesis research, I developed computation techniques based on pseudo-potential methods to calculate from first principles optical properties of nonlinear optical (NLO) materials, especially the borate-series. This work has led to a series of publications within the group since then.

Funding

2004-2006 ARCS software project. $580K/year. **Developer**

2006-2012 NSF DANSE software project. $2.4M/year. **Lead developer** of the inelastic group

2011-2013 KISS technical program "Monitoring Earth Surface Changes from Space" $240K/year. **Architect**

2012-Now NSF Sustainable Software Innovation Institute Award "Collaborative Research: Scientific Software Innovation Institute for Advanced Analysis of X-Ray and Neutron Scattering Data (SIXNS)". $240K/year. **A main contributor** of reports to NSF

2012-Now ORNL subcontract"Virtual Neutron Facility at SNS" $170K/year. **Project lead**

2013-2014 Caltech/JPL President's and Director's Fund "The Advanced Rapid Imaging and Analysis (ARIA) Co-laboratory for Natural Hazards Research" $298K/year. **Co-Investigator**

Selected Publications
Refereed Journals

1. **Lin JYY**, Aczel AA, Abernathy DL, Nagler SE, Buyers WJL, and Granroth GE, *Using Monte Carlo ray tracing simulations to model the quantum harmonic oscillator modes observed in uranium nitride,* Physical Review B, 89, 144302, 2014.
2. Abernathy DL et al, *Design and operation of the wide angular-range chopper spectrometer ARCS at the Spallation Neutron source,* Rev. Sci. Intrum. 83, 015114, 2012.
3. Keith JB et al, *AtomSim: web-deployed atomistic dynamics simulator,* J Applied Crystallography 43: 1553 Dec 2010.
4. Christianson AD et al, *Phonon Density of States of LaFeAsO1-xFx,* Phys Rev Letters 101 (15): 157004 Oct 2008.
5. Delaire O, Kresch M, Munoz JA, Lucas MS, **Lin JYY,** and Fultz B, *Electron-phonon interactions and high-temperature thermodynamics of vanadium and its alloys,* Phys Rev B 77 (21): 214112 June 2008.
6. Kresch M, Lucas M, Delaire O, **Lin JYY,** and Fultz B, *Phonons in aluminum at high temperatures studied by inelastic neutron scattering,* Phys Rev B 77 (2): 024301 Jan 2008.
7. Chen CAH et al.: *Characterization of a large-format, fine-pitch CdZnTe pixel detector for the HEFT balloon-borne experiment*, IEEE TRANSACTIONS ON NUCLEAR SCIENCE 51(5): 2472 OCT 2004
8. **Lin JYY** and Fultz B, *Site-specific Long-Range Order in 57Fe3Al Measured by Mossbauer Diffractometry,* Phil Mag 83, 2621-2640 (2003).
9. Kriplani U, **Lin JYY**, Regehr MW, et al. *Intensities of Mossbauer diffractions from polycrystalline bcc Fe-57* Phys Rev B 65 (2): art. no. 024405 JAN 1 2002

10. **Lin JYY,** Kriplani U, Regehr M, et al. *Polarization factors for Fe-57 Mossbauer diffractions from polycrystals*, Hyperfine Interact 136 (3): 663-672 2001

11. Lin ZS, **Lin J**, Wang ZZ, et al. *Mechanism for linear and nonlinear optical effects in LiB3O5, CsB3O5, and CsLiB6O10 crystals*, Phys Rev B 62 (3): 1757-1764 JUL 15 2000

12. **Lin J**, Lee MH, Liu ZP, and Chen CT. *Mechanism for linear and nonlinear optical effects in beta-BaB2O4 crystals*, Phys Rev B 60 (19): 13380-13389 NOV 15 1999

13. Chen CT, Ye N, **Lin J**, et al. *Computer-assisted search for nonlinear optical crystals*, Adv Mater 11 (13): 1071-+ SEP 9 1999

Books

1. B. Fultz, T. Kelley, **J. Y. Y. Lin**, J.D. Lee, O. Delaire, M. Kresch, M. Mckerns, and M. A. Aivazis, *Experimental Inelastic Neutron Scattering*, 2006-2014

Selected Presentations

1. **Jiao Lin** et al, Invited talk, *Monte Carlo simulations of multiple scattering from samples and sample environments*, WINS, May 2014

2. **Jiao Lin**, luban: a minimalist UI 'language', Scipy 2012

3. **Jiao Lin**, J Brandon Keith, Michael Mckerns, Michael Aivazis, Brent Fultz, *Virtual Neutron Facility*, ICNS, May 2009

4. **Jiao Lin**, Invited talk, *DrChops*, Direct Geometry Spectrometer Software Meeting, May 2009

5. **Jiao Lin**, Garrett Granroth, Olivier Delaire, Doug Albernathy, Michael Aivazis, Brent Fultz, *Monte Carlo simulation of ARCS instrument using pyre framework*, SNS-HFIR User Meeting, October 2005.

6. **Jiao Lin**, Ryan Monson, and Brent Fultz, *Long-range order of defects revealed by Mossbauer powder diffractometry*, APS 2005 March Meeting